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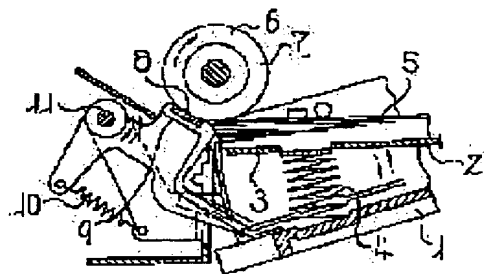
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## (54) DEVICE AND METHOD FOR SORTING PAPER SHEET

(57)Abstract:

PURPOSE: To provide a device and a method for sorting paper sheets by which paper sheets of different kinds can surely be sorted and fed.

CONSTITUTION: A paper sorting device comprises a conveying force generating mechanism 7 for applying conveying forces to paper sheets 5, a convey stopping force generating mechanism 8 for pressing the paper sheets 5 into contact with the conveying force generating mechanism 7, and a vibrating mechanism for transmitting vibration to the convey stopping force generating mechanism 8, and the vibrating state of the convey stopping force generating mechanism 8 is varied so as to control convey stopping forces applied to the paper sheets 5 by the convey stopping force generating mechanism 8.



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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] In OA equipment etc., this invention relates to the paper leaf decollator and the paper leaf separation approach of dividing paper leaf into one sheet at a time, when conveying the paper leaf by which the laminating was carried out.

[0002]

[Description of the Prior Art] Conventionally, the corner at the tip of the paper leaf of the maximum upper layer is pressed down on tip both sides of the sheet paper cassette which carries out the laminating of the paper leaf and contains it by the separation pawl, the paper leaf of the maximum upper layer is called to them, it sends out compulsorily with a roller, and there is a paper leaf decollator which prevents flattery conveyance of the paper leaf below the following layer by the separation pawl.

[0003] Moreover, there is a paper leaf decollator which attracts at a time one paper leaf by which the laminating was carried out according to negative pressure developmental mechanics, and sent it out.

[0004] Furthermore, only the paper leaf which a reverse roller, a friction pad, etc. which are driven on a motor through a torque limiter are contacted on a delivery roller, and contacts a delivery roller is compulsorily sent out with this delivery roller, and when the paper leaf of two or more sheets laps between a reverse roller, or a friction pad and a delivery roller and it advances to it, there is a paper leaf decollator which prevented advance of the paper leaf below the following layer with the reverse roller or the friction pad.

[0005]

[Problem(s) to be Solved by the Invention] The method which presses down the corner of the tip both sides of paper leaf by the separation pawl separates from a separation pawl, when the paper leaf sent out with a call roller bends with its nerve, but since the nerve of paper leaf changes with quality of paper or thickness, depending on the class of paper leaf, it may break with a separation pawl, or may be torn, and the probability of occurrence of a jam becomes high.

[0006] The method which attracts paper leaf with an aspirator has the high separability ability of paper leaf. However, since negative pressure developmental mechanics is needed, equipment becomes large-scale and cost also becomes high. The noise by pumping operation of negative pressure developmental mechanics occurs, and, moreover, exchange of paper leaf is troublesome.

[0007] The friction separation method using a reverse roller or a friction pad Although it is necessary to set the frictional force which acts between a delivery roller and paper leaf as the highest value, and to set the frictional force which acts between a reverse roller or a friction pad, and paper leaf next as a value higher than the frictional force which acts between paper leaf Such frictional force changes with the temperature and humidity in an operating environment, changes also with the quality of paper of paper leaf, and changes also with adhesion of paper powder further. Therefore, it is difficult to separate paper leaf certainly.

[0008]

[Means for Solving the Problem] The conveyance force developmental mechanics which has the mechanical component which drives the body of revolution contacted by paper leaf and this body of revolution, the conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics constitute invention of claim 1.

[0009] Invention of claim 2 constitutes a shaker style by the elastic body and the electric machine sensing element in claim 1.

[0010] Invention of claim 3 uses the shaker style which generates supersonic vibration 20kHz [ or more ] or subsonic vibration 500Hz or less in claim 1.

[0011] In claim 2, the interior opens predetermined spacing in the inside of this roller for the electric machine sensing element as an oscillating generation source, using a roller in the air as conveyance inhibition force developmental mechanics, and invention of claim 4 sticks.

[0012] Invention of claim 5 is the paper leaf separation approach which controlled the energy or oscillation frequency which prepares the conveyance force developmental mechanics which has the mechanical component

which drives the body of revolution contacted by paper leaf and this body of revolution, the conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics, and is supplied to this shaker style.

[0013] The conveyance force developmental mechanics which has the mechanical component which drives the body of revolution by which invention of claim 6 is contacted by paper leaf, and this body of revolution, The conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics, The paper leaf detector formed in the downstream of said conveyance inhibition force developmental mechanics in a paper leaf conveyance path is formed. It is the paper leaf separation approach of making active gradually an oscillating generating operation of said shaker style from a fixed condition immediately after feed initiation, and having returned the oscillating generating operation of said shaker style to the fixed condition after the output of the paper leaf detecting signal by said paper leaf detector.

[0014]

[Function] According to invention of claim 1, convey paper leaf by giving the conveyance force to the paper leaf by which the laminating was carried out from the body of revolution of conveyance force developmental mechanics, but flattery advance of the paper leaf below the following layer being prevented according to conveyance inhibition force developmental mechanics, when the paper leaf of two or more sheets laps and is sent out, and by 4s \*\* vibrating conveyance inhibition force developmental mechanics to a shaker style at this time The conveyance inhibition operation by conveyance inhibition force developmental mechanics can be controlled, thereby, by setting up more highly coefficient of friction of the front face of the conveyance inhibition force generating section beforehand, and vibrating conveyance inhibition force developmental mechanics if needed, it can be made to be able to respond to change of quality of paper, and paper leaf can be separated certainly.

[0015] According to invention of claim 2, a miniaturization and thin-shape-izing of a shaker style can be attained with the combination of an elastic body and an electric machine sensing element.

[0016] According to invention of claim 3, since conveyance inhibition force developmental mechanics can be vibrated with the frequency of 20kHz or more or 500Hz or less, generating of the noise accompanying vibration can be controlled.

[0017] According to invention of claim 4, since a shaker style can be arranged using the building envelope of the roller as conveyance inhibition force developmental mechanics, and structure can be simplified and the front face of a roller can be vibrated directly, control of vibration can be made easy, in connection with this, control of the frictional force of the roller to paper leaf can be made easy, and, moreover, the application range of frictional force control can be extended.

[0018] According to invention of claim 5, by controlling the energy or oscillation frequency supplied to an electric machine sensing element, the conveyance inhibition force of conveyance inhibition force developmental mechanics can be changed without using a complicated controlling mechanism, and, thereby, the segregation of paper leaf can be promoted more effectively.

[0019] By returning an oscillating generating operation of a shaker style to a fixed condition, when according to invention of claim 6 an oscillating generating operation of said shaker style is gradually made active from a fixed condition immediately after feed initiation and a paper leaf detector detects passage of paper leaf The conveyance inhibition force of conveyance inhibition force developmental mechanics can be changed with time, even if this conveys at random the paper leaf with which quality of paper differs, when it changes to the conveyance inhibition force according to the paper leaf, it can dissociate certainly and any paper leaf can be conveyed.

[0020]

[Example] The first example of this invention is explained based on drawing 1 thru/or drawing 4 . Although only a part is illustrated as shown in drawing 1 , the sheet paper cassette 1 is formed. The bottom plate 2 by which the pad 3 was joined to the part is energized up by this sheet paper cassette 1 with a spring 4, and is prepared in it free [ boom hoisting ] . this bottom plate 2 -- many -- the shape of a laminating of the paper leaf 5 of several sheets is carried out. Moreover, the friction pad 8 as the conveyance force developmental mechanics 7 which has the mechanical component (not shown) which drives the delivery roller 6 and this delivery roller 6 as body of revolution contacted at the tip of the paper leaf 5 of the maximum upper layer on a bottom plate 2, and conveyance inhibition force developmental mechanics which carries out the pressure welding of the paper leaf 5 to the delivery roller 6 is formed. It is formed with an ingredient with high coefficient of friction, such as polyurethane, and the mount 9 holding this friction pad 8 is counterclockwise energized with a spring 10, and this friction pad 8 is held free [ rotation ] at the pivot 11. The shaker style 12 as shown in this mount 9 at drawing 2 is formed. That is, the shaker style 12 has the elastic body 13 formed of metal material, and two or more electrostrictive ceramics 14 and 15 as an electric machine sensing element, and transmits supersonic vibration 20kHz or more to said friction pad 8. Two or more projected parts 16 are arranged in the shape of a ctenidium by the whole surface by the side of the friction pad 8 of said elastic body 13, and are formed in it. And polarization of said electrostrictive ceramics 14 and 15 is carried out, and it is arranged by turns so that the direction of polarization may become reverse, respectively.

[0021] In such a configuration, the electrical potential difference impressed to electrostrictive ceramics 14 and 15 is

a sine wave in phase or a pulse wave. In the case of a pulse wave, what the offset equivalent to the amplitude is added for is desirable. Electrostrictive ceramics 14 is extended, electrostrictive ceramics 15 is shrunk, by impression of this electrical potential difference, as shown in drawing 3 (a), as shown in drawing 3 (b), the actuation in which electrostrictive ceramics 14 is shrunk and electrostrictive ceramics 15 is extended is repeated, and thereby, the standing wave crooked in that thickness direction in an elastic body 13 occurs. That is, the friction pad 8 vibrates. At this time, the amount of vibration displacement can be enlarged by making equal to the resonance frequency of an elastic body 13 the frequency which drives electrostrictive ceramics 14 and 15.

[0022] In case the paper leaf 5 by which the laminating was carried out to the bottom plate 2 is conveyed, the delivery roller 6 is driven by the motor, the conveyance force is given to paper leaf 5 from this delivery roller 6, but when the paper leaf 5 of two or more sheets laps and is sent out, flattery advance of the paper leaf 5 below the following layer can be prevented with the friction pad 8. If vibration is delivered that it mentioned above at this time to the friction pad 8, on the friction pad 8, minute vertical motion will take place and the frictional force over paper leaf 5 will decline. If it puts in another way, the conveyance inhibition operation with the friction pad 8 can be controlled. The paper leaf 5 of varieties is certainly separable by setting coefficient of friction of the friction pad 8 as the comparatively high value, making it by this, correspond to change of quality of paper, and controlling a conveyance inhibition operation of the friction pad 8. This was able to be checked also by the next experiment. Namely, as shown in drawing 4, the friction pad 8 is joined on the base 17 in which the shaker style 12 was formed. A spindle 18 is carried on the paper leaf 5 put on the top face of this friction pad 8. When the force required in order to pull paper leaf 5 (paper of fine quality of 135k) in this condition was measured, it was checked that that tensile force becomes smaller than the case where the direction at the time of making vibration give the friction pad 8 does not give vibration.

[0023] Moreover, a miniaturization and thin-shape-izing of the shaker style 12 can be attained with the combination of an elastic body 13 and electrostrictive ceramics 14 and 15. Furthermore, since the friction pad 8 can be vibrated with the frequency of 20kHz or more, generating of the noise accompanying vibration can be controlled.

[0024] In addition, in order to make it correspond to change of the quality of paper of paper leaf 5, to change the conveyance inhibition force and to change vibration given to the friction pad 8, there are an approach of changing the arrangement location or the number of electrostrictive ceramics 14 and 15, an approach of controlling the energy supplied to electrostrictive ceramics 14 and 15, and the approach of controlling the drive frequency which drives electrostrictive ceramics 14 and 15 to the resonance frequency of an elastic body 13. In this example, it is based on the approach of controlling drive frequency.

[0025] Namely, a drawing form, a postcard, form (OHP form is called below.) 135 transparent paper of fine quality used for an overhead projector, And a table is created experimentally in quest of the drive frequency from which the conveyance inhibition force with the friction pad 8 serves as optimal value whenever the thickness of these paper leaf changes. every different paper leaf, such as an envelope, -- According to the class of paper leaf, the class of paper leaf was inputted with a switch etc., and when feed actuation was performed based on the table data called by this input, it was able to dissociate certainly and paper was able to be fed to all paper leaf. Moreover, feed number of sheets exceeded thousands of sheets, and they dividing each paper leaf into satisfaction, when the jam was generated in the dirt former with paper powder and the delivery roller 6 and the friction pad 8 reset up the drive frequency of electrostrictive ceramics 14 and 15, and feeding paper was checked.

[0026] In addition, since the conveyance force of the delivery roller 6 and the frictional force of the delivery roller [ as opposed to / if it puts in another way / paper leaf ] 6 affect a feed operation according to the class of paper leaf 5, vibrating the delivery roller 6 by the shaker style 12 is also considered.

[0027] Subsequently, the second example of this invention is explained based on drawing 5 and drawing 6. the same part as said example also omits explanation using the same sign (the following -- the same). Drawing 5 is the vertical section side elevation in which seeing from the feed direction of paper leaf and showing some mounts 9. The shaker style 19 is laid under this mount 9. This shaker style 19 forms the bridge 22 which is the elastic body displaced in the direction which intersects perpendicularly with the conveyance direction of paper leaf at the metal material 20 by making the flexible sections 21 of two or more thin meat, and these flexible sections 21 transform, and is constituted by fixing the both ends of the laminating piezoelectric device 24 as an electric machine sensing element to the base 23 of the metal material 20 the 1 side of this bridge 22. And the friction pad 8 is joined to the top face of the both sides of the metal material 20, and the top face of a bridge 22.

[0028] In such a configuration, the electrical potential difference impressed to the laminating piezoelectric device 24 is a sine wave in phase or a pulse wave. In the case of a pulse wave, what the offset equivalent to the amplitude is added for is desirable. By a bridge's 22 displacing to the method of the right, when the laminating piezoelectric device 24 is shrunk, as shown in drawing 6 (a), a bridge's 22 displacing to the left, when the laminating piezoelectric device 24 is shrunk, as shown in drawing 6 (b), and repeating this actuation by impression of this electrical potential difference, the friction pad 8 is vibrated and the conveyance inhibition force over paper leaf can be made small. In this example, the drive frequency of the laminating piezoelectric device 24 is set to 80Hz equal to the resonance frequency of a bridge 22. If it is low frequency 500Hz or less according to our experiment, since people do not sense that it is not much loud, it is desirable to set resonance frequency to 500Hz or less like this example. Moreover, by changing the driver voltage (energy) of the laminating piezoelectric device 24, vibration

given to the friction pad 8 can be changed and the conveyance inhibition force over paper leaf can be changed. [0029] Furthermore, the third example of this invention is explained based on drawing 7. The shaker style 25 in this example is formed, when two or more projected parts 16 joined to the friction pad 8 arrange two or more electrostrictive ceramics 14, 15, 26, and 27 which is electric machine sensing elements, respectively along the conveyance direction of paper leaf on the inferior surface of tongue of the elastic body 13 formed along the conveyance direction (the direction of an arrow head) of paper leaf and join to it. That is, this shaker style 25 has the same structure as the principle of the progressive wave mold supersonic-wave motor of a linear. Mutually, the direction of polarization is reverse, it is arranged by turns, the electrostrictive ceramics 26 and 27 similarly located in a B horizon also has the mutually reverse direction of polarization, and the electrostrictive ceramics 14 and 15 located in an A horizon is arranged by turns.

[0030] In such a configuration, by shifting 90 degrees of phases to the electrostrictive ceramics 14 and 15 of an A horizon, and the electrostrictive ceramics 26 and 27 of a B horizon, and impressing the electrical potential difference of a sine wave or a pulse wave to them, the progressive wave acquired by composition with the standing wave of the electrostrictive ceramics 14 and 15 of an A horizon and the standing wave of the electrostrictive ceramics 26 and 27 of a B horizon can be given to the friction pad 8, and the conveyance force can be given to paper leaf by this progressive wave. That is, with the conveyance direction of paper leaf with the delivery roller 6, the conveyance force (conveyance inhibition force) of conveying paper leaf to hard flow can be acquired. Therefore, the function as a reverse roller with complicated structure can be given to this friction pad 8. The reverse roller said here is a reverse roller to which it drives on a motor through a torque limiter, and calls and which is contacted by the roller. And the conveyance inhibition force over paper leaf can be changed by controlling the drive frequency of electrostrictive ceramics 14, 15, 26, and 27 according to the class of paper leaf. Also in this example, when the table data of the optimal drive frequency were set up for every thickness of those paper leaf and the \*\*\*\* trial was performed for every various paper leaf again, obtaining the result of the \*\*\*\* trial in said first example and the same result as abbreviation was checked.

[0031] Furthermore, the fourth example of this invention is explained based on drawing 8 thru/or drawing 10. the bottom plate 2 which is a sheet paper cassette and is made this sheet paper cassette 28 by the lever 29 prepares 28 free [ boom hoisting ] -- having -- this bottom plate 2 -- many -- the laminating of the paper leaf 5 of several sheets is carried out. 30 is conveyance force developmental mechanics. The pickup arm 31 with which this conveyance force developmental mechanics 30 was held free [ rotation ], The delivery roller 32 which is the body of revolution held free [ rotation at the rotation core of this pickup arm 31 ], The call roller 33 held free [ the rotation to the rotation free end of the pickup arm 31 ], It consists of gears 34 and 35 which called with the edge of the shaft of the delivery roller 32, and were fixed to the edge of the shaft of a roller 33, and an idler gear 36 which geared on these gears 34 and 35 and was held free [ rotation ] at the pickup arm 31. Said delivery roller 32 is driven on a motor, and rotation of this delivery roller 32 is transmitted to said call roller 33 through a gear 34, the idler gear 36, and a gear 35. Moreover, the reverse roller 37 which is conveyance inhibition force developmental mechanics is formed, and the pressure welding of this reverse roller 37 is carried out to said delivery roller 32 by the pressurization arm 39 energized by the spring 38.

[0032] A diameter is set to 25mm and said delivery roller 32 is formed for the periphery with the high ingredient of coefficient of friction of rubber etc. Moreover, said reverse roller 37 also differs from the coefficient of friction and coefficient of friction of the reverse roller 37, although a diameter is set to 25mm and the periphery is formed with ingredients, such as rubber of the high urethane system of coefficient of friction.

[0033] A deer is carried out, and as shown in drawing 9 and drawing 10, the shaker style 40 is formed in the interior of said reverse roller 37. This shaker style 40 consists of a tubed elastic body 41 which was formed of the leaf of 0.2mm board thickness, and was joined to the inner skin of the reverse roller 37, and two or more electrostrictive ceramics 14 and 15 joined by the inside of this elastic body 41. And fitting of the shaft 42 in the air connected with the motor through the torque limiter which is not illustrated in the core of the reverse roller 37 is carried out fixed, and it lets the code 43 connected to said electrostrictive ceramics 14 and 15 pass inside the shaft 42 from the hole 44 formed in the shaft 42. Furthermore, two or more terminals (not shown) connected to each code 43 are arranged by the edge outside periphery of a shaft 42, the brush (not shown) contacted by these terminals is connected to a power source, and it is prepared. That is, it is constituted so that an electrical potential difference may be impressed to said electrostrictive ceramics 14 and 15 through these brushes, terminals, and codes 43.

[0034] In such a configuration, the electrical potential difference impressed to electrostrictive ceramics 14 and 15 is a sine wave in phase or a pulse wave. In the case of a pulse wave, what the offset equivalent to the amplitude is added for is desirable. By impression of this electrical potential difference, the standing wave crooked in that thickness direction in an elastic body 41 occurs, and the periphery of the reverse roller 37 vibrates. The frequency which drives the electrostrictive ceramics 14 and 15 at this time is 23kHz equal to the resonance frequency of an elastic body 41. Thereby, generating of the noise can be prevented.

[0035] In case the paper leaf 5 by which the laminating was carried out to the bottom plate 2 is conveyed, it calls by the motor, a roller 33 and the delivery roller 32 are driven, the conveyance force is given to paper leaf 5, but when the paper leaf 5 of two or more sheets laps and is sent out, flattery advance of the paper leaf 5 below the following layer can be prevented with the reverse roller 37 which rotates to the conveyance direction and hard flow (it sets to

drawing 8 and is the clockwise rotation) of paper leaf 5. If vibration is delivered that it mentioned above at this time to the reverse roller 37, the frictional force over paper leaf 5 will decline. If it puts in another way, the conveyance inhibition operation with the reverse roller 37 can be controlled. The paper leaf 5 of varieties is certainly separable by setting coefficient of friction of the reverse roller 37 as the comparatively high value, making it by this, correspond to change of quality of paper, and controlling a conveyance inhibition operation of the reverse roller 37. [0036] Furthermore, the fifth example of this invention is explained based on drawing 11. This example is the paper leaf separation approach of forming the paper leaf detector 45 near the downstream of the reverse roller 37, making active gradually an oscillating generating operation of the shaker style 40 in the reverse roller 37 from a fixed condition immediately after feed initiation, and having returned the oscillating generating operation of said shaker style 40 to the fixed condition after the output of the paper leaf detecting signal by said paper leaf detector 45, in the configuration in said fourth example.

[0037] That is, in the usual condition that the pickup arm 31 is located up, and calls and a roller 33 deserts paper leaf 5, when a paper feed start signal is inputted, while driving the call roller 33, the delivery roller 32, and the reverse roller 37, the pickup arm 31 is dropped with the drive which is not illustrated, it calls, and a roller 33 is contacted to the paper leaf 5 of the maximum upper layer. At this time, the shaker style 40 is maintained in the condition of not vibrating. When the paper leaf 5 on a bottom plate 2 reaches the contact section of the delivery roller 32 and the reverse roller 37, the shaker style 40 is vibrated by small vibration, and an oscillating generating operation of the shaker style 40 is henceforth activated with the passage of time. It is desirable to make this change perform continuously. In the meantime, immediately after feed initiation, although the conveyance inhibition force of the reverse roller 37 over paper leaf 5 is large, it becomes small gradually. Here, since coefficient of friction of the reverse roller 37 is set as the value higher than conventional it, it will be in the condition that will be in the condition of being easy to generate non-delivery when the direction of the conveyance inhibition force becomes high with the reverse roller 37 and the tip of paper leaf 5 reaches the reverse roller 37 rather than the paper leaf conveyance force with the call roller 33 and the delivery roller 32, or only one paper leaf 5 is separated. At this time, if an oscillating generating operation of the shaker style 40 activates gradually as mentioned above, the conveyance inhibition force of the reverse roller 37 will become small gradually, and the conveyance force of paper leaf 5 will exceed the conveyance inhibition force with the passage of time. Thereby, one sheet dissociates at a time certainly, and paper leaf 5 passes through between the delivery roller 32 and the reverse rollers 37, unless very powerful static electricity is worn. And when the paper leaf detector 45 detects passage of paper leaf 5, an oscillating generating operation of the shaker style 40 is returned to a fixed condition (idle state), and the pickup arm 31 is rotated up, it calls, a roller 33 is separated from the paper leaf 5 on a bottom plate 2, the call roller 33, the delivery roller 32, and the reverse roller 37 are stopped, and the next feed actuation is made to stand by.

[0038] As mentioned above, the optimal separation conditions can be looked for in the process in which separation conditions are changed into the condition of starting heavy delivery from the condition which controls the conveyance inhibition force of the reverse roller 37, and non-delivery tends to generate, without making complicated actuation give an operator by this, it can dissociate certainly and the paper leaf 5 of any quality of paper can be made to convey according to this example.

[0039] In order to check the effectiveness of this example, the \*\*\*\* trial was performed using the drawing form which carried out the laminating at random, an OHP form, and 135k paper of fine quality, but when feed number of sheets exceeded five omasums and the jam was generated by the call roller 33, the delivery roller 32, and the reverse roller 37 in the dirt former with paper powder, it was checked that the probability for a jam to be generated compared with the conventional separation mechanism falls fairly.

[0040] The paper leaf detector 45 in this example is not what was prepared specially, in order to control the shaker style 40, and it diverts the conventional photosensor formed in order to detect passage of paper leaf 5 and to perform other control.

[0041] Furthermore, the sixth example of this invention is explained based on drawing 12. In the configuration of said fifth example, this example arranges the pull out roller 46 and the paper leaf detector 47 in the downstream of the paper leaf detector 45, and connects with the pressurization arm 39 the plunger of the solenoid 48 driven by the paper leaf detecting signal of this paper leaf detector 47. In addition, the paper leaf detector 47 is not what was prepared specially, in order to control a solenoid 48, and it diverts the conventional photosensor formed in order to detect passage of paper leaf 5 and to perform other control.

[0042] Only a point which is different from said fifth example about the operation in this example is explained. Namely, when the paper leaf 5 which passed through between the delivery roller 32 and the reverse rollers 37 reaches the pull out roller 46, paper leaf 5 is in the condition certainly divided into one sheet. When the tip of paper leaf 5 is detected by the paper leaf detector 47 just behind that, the pressure-welding condition of the reverse roller 37 over the paper leaf 5 in contact with the delivery roller 32 can be canceled by exciting a solenoid 48 and rotating the pressurization arm 39. Even if the reverse roller 37 can extend by this the period when dirt frictional force declines with paper powder, therefore feed number of sheets increases further, the segregation of paper leaf 5 can be made to perform certainly.

[0043]

[Effect of the Invention] The conveyance force developmental mechanics which has the mechanical component



which drives the body of revolution by which invention of claim 1 is contacted by paper leaf, and this body of revolution, Although paper leaf is conveyed by giving the conveyance force to the paper leaf by which the laminating was carried out from the body of revolution of conveyance force developmental mechanics since the conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics constituted flattery advance of the paper leaf below the following layer being prevented according to conveyance inhibition force developmental mechanics, when the paper leaf of two or more sheets laps and is sent out, and by 4s \*\* vibrating conveyance inhibition force developmental mechanics to a shaker style at this time The conveyance inhibition operation by conveyance inhibition force developmental mechanics can be controlled. By this It has the effectiveness that it can be made to be able to respond to change of quality of paper, and paper leaf can be separated certainly, by setting up more highly coefficient of friction of the front face of the conveyance inhibition force generating section beforehand, and vibrating conveyance inhibition force developmental mechanics if needed.

[0044] In claim 1, since invention of claim 2 constituted the shaker style by the elastic body and the electric machine sensing element, it has the effectiveness that a miniaturization and thin-shape-izing of a shaker style can be attained.

[0045] In claim 1, since invention of claim 3 used the shaker style which generates supersonic vibration 20kHz [ or more ] or subsonic vibration 500Hz or less, it can control generating of the noise accompanying vibration.

[0046] Since the interior opened predetermined spacing in the inside of this roller and stuck the electric machine sensing element as an oscillating generation source on it in claim 2, using a roller in the air as conveyance inhibition force developmental mechanics, invention of claim 4 A shaker style can be arranged using the building envelope of a roller, and structure can be simplified. Moreover, since the front face of a roller can be vibrated directly, control of vibration can be made easy, in connection with this, control of the frictional force of the roller to paper leaf can be made easy, and it has the effectiveness of being able to extend the application range of frictional force control.

[0047] The conveyance force developmental mechanics which has the mechanical component which drives the body of revolution by which invention of claim 5 is contacted by paper leaf, and this body of revolution, Since the energy or oscillation frequency which prepares the conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics, and is supplied to this shaker style was controlled The conveyance inhibition force of conveyance inhibition force developmental mechanics can be changed without using a complicated controlling mechanism, and this has the effectiveness that the segregation of paper leaf can be promoted more effectively.

[0048] The conveyance force developmental mechanics which has the mechanical component which drives the body of revolution by which invention of claim 6 is contacted by paper leaf, and this body of revolution, The conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics, The paper leaf detector formed in the downstream of said conveyance inhibition force developmental mechanics in a paper leaf conveyance path is formed. Since an oscillating generating operation of said shaker style is gradually made active from a fixed condition immediately after feed initiation and the oscillating generating operation of said shaker style was returned to the fixed condition after the output of the paper leaf detecting signal by said paper leaf detector The conveyance inhibition force of conveyance inhibition force developmental mechanics can be changed with time, and even if this conveys at random the paper leaf with which quality of paper differs, when it changes to the conveyance inhibition force according to the paper leaf, it has the effectiveness that it can dissociate certainly and any paper leaf can be conveyed.

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**CLAIMS**

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[Claim(s)]

[Claim 1] The paper leaf decollator characterized by consisting of the conveyance force developmental mechanics which has the mechanical component which drives the body of revolution contacted by paper leaf and this body of revolution, conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and a shaker style which transmits vibration to this conveyance inhibition force developmental mechanics.

[Claim 2] The paper leaf decollator according to claim 1 characterized by constituting a shaker style by the elastic body and the electric machine sensing element.

[Claim 3] The paper leaf decollator according to claim 1 characterized by using the shaker style which generates supersonic vibration 20kHz [ or more ] or subsonic vibration 500Hz or less.

[Claim 4] The paper leaf decollator according to claim 2 with which the interior is characterized by having opened predetermined spacing in the inside of this roller, and sticking an electric machine sensing element on it, using a roller in the air as conveyance inhibition force developmental mechanics.

[Claim 5] The paper leaf separation approach characterized by controlling the energy or oscillation frequency which prepares the conveyance force developmental mechanics which has the mechanical component which drives the body of revolution contacted by paper leaf and this body of revolution, the conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics, and is supplied to this shaker style.

[Claim 6] The conveyance force developmental mechanics which has the mechanical component which drives the body of revolution contacted by paper leaf and this body of revolution, The conveyance inhibition force developmental mechanics which carries out the pressure welding of said paper leaf to said body of revolution, and the shaker style which transmits vibration to this conveyance inhibition force developmental mechanics, The paper leaf detector formed in the downstream of said conveyance inhibition force developmental mechanics in a paper leaf conveyance path is formed. The paper leaf separation approach which is made to make active gradually an oscillating generating operation of said shaker style from a fixed condition immediately after feed initiation, and is characterized by returning an oscillating generating operation of said shaker style to a fixed condition after the output of the paper leaf detecting signal by said paper leaf detector.

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[Translation done.]



## \* NOTICES \*

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the front view showing the first example of this invention.

[Drawing 2] It is the front view of a shaker style.

[Drawing 3] It is the front view showing actuation of a shaker style.

[Drawing 4] It is the front view showing the condition of examining the effectiveness of a shaker style.

[Drawing 5] It is the vertical section side elevation of the shaker style in the second example of this invention.

[Drawing 6] It is the side elevation showing actuation of a shaker style.

[Drawing 7] It is the front view of the shaker style in the third example of this invention.

[Drawing 8] It is the front view showing the fourth example of this invention.

[Drawing 9] It is the vertical section front view of a reverse roller.

[Drawing 10] It is the vertical section side elevation of a reverse roller.

[Drawing 11] It is the front view showing the fifth example of this invention.

[Drawing 12] It is the front view showing the sixth example of this invention.

### [Description of Notations]

5 Paper Leaf

6 Body of Revolution

7 Conveyance Force Developmental Mechanics

8 Conveyance Inhibition Force Developmental Mechanics

12 Shaker Style

13 Elastic Body

14 15 Electric machine sensing element

19 Shaker Style

22 Elastic Body

24 Electric Machine Sensing Element

25 Shaker Style

26 27 Electric machine sensing element

30 Conveyance Force Developmental Mechanics

32 Body of Revolution

37 Conveyance Inhibition Force Developmental Mechanics

40 Shaker Style

41 Elastic Body

45 Paper Leaf Detector

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[Translation done.]

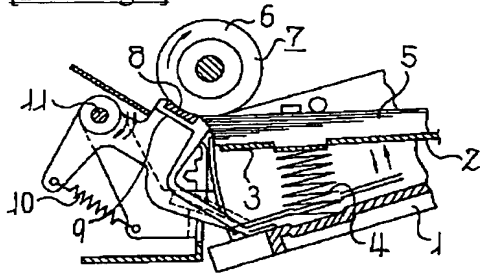
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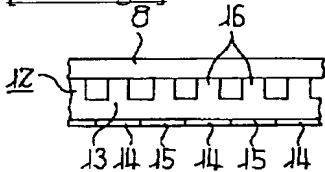
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DRAWINGS

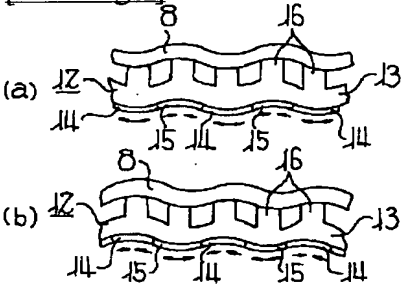
[Drawing 1]



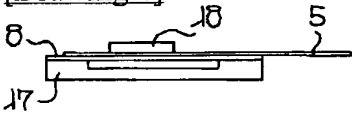
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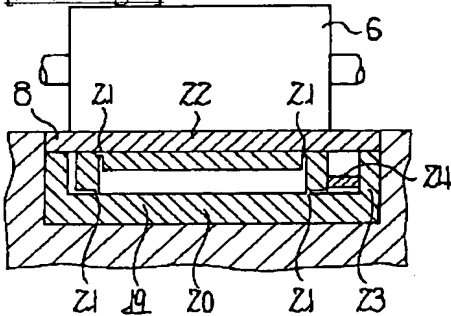
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Drawing 6]



{Translation done.}